APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/768,301	01/25/2001	Sang Kyun Cha	K-254	4139

34610   7590   03/26/2003

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EXAMINER
TO, BAOQUOC N

ART UNIT	PAPER NUMBER
2172	

DATE MAILED: 03/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)   4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)   5)☐ Notice of Informal Patent Application (PTO-152)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .   6)☐ Other: .

DETAILED ACTION

1.   The applicant submitted claims 1-35 and 37. According to rule 1.126, they are

renumbered as 1-36.

Priority

2.   Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which

papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bordsen et al. (US. Patent No. 5,193,162) in view of Bohannon et al. (US. Patent No.

6,449,623).

Regarding on claims 1, 24 and 34, teaches method of logging updates in a main-

memory transaction-processing system having main memory for storing a database,

one or more log disks for storing log records for parallel recovery of the main memory

database, and one or more backup disks for storing a copy of the main memory

database, the method comprising the steps of:

Taking a before image of the database before an update to the database is made

(a before-look is formed) (co. 9, lines 53-54);

Taking an after image of the database after the update is made (a after look are

also formed) (col. 9, lines 54-55);

Generating a different log as a log body of each log record by applying a bit-wise

exclusive-OR (XOR) operation between the before image and the after image (col. 11,

lines 29-33).

Bordsen does not explicitly teaches recovering from a failure by applying the XOR operation between the different log and the before-image. However, Bordsen teaches, "the transaction typically will store its state multiple times while the transaction is running. The storage of the state information must go to a media which will survive a failure" (col. 9, lines 22-25). This teaches the storage act as the log file to store multiple state transactions. In addition, Bordsen also teaches, "the concurrent application of the before-look and after-look images to the data compactor 68, which may be an XOR network gates, provides a representation on the lines 70 of the different between the before look image and the after look image" (col. 11, lines 29-33). This teaches the XOR provides the database images before and after the transactions. Further more, Bordsen also teaches, "the non-volatile memory recovery scheme used involves "quick look," that is, all updates are made to the non-volatile cache memory copy immediately, and a before-look is formed in case there is a failure" (col. 9, lines 51-54). This teaches the during the transaction failure, the recovery can read the log file which stored the transaction state and the before-image that reform before the transaction. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to include XOR containing different between before and after images to compare the different states (log) of the transaction and before-image in order to provide the transaction recovery in the event of any system failure.

Regarding on claims 2 and 25, Bordsen teaches the database comprises a plurality of fixed-size pages (pages) (col. 8, line 9).

Regarding on claim 3, Bordsen teaches each log record has a log header comprising:

LSN (Log Sequence Number) for storing log sequence (col. 8, lines 14-17);

(TID) (Transaction ID) for storing the identity of the transaction that created the log record (col. 8, lines 10-13);

previous LSN for storing the identity of the most recently created log by the same transaction (col. 8, lines 14-17);

Type for storing the type of the log record (col. 8, lines 20-24);

Backup ID for storing the relation between the log record and the updated page for use with fuzzy check pointing (col. 8, lines 35-40);

Page ID for storing the identity of an updated page (col. 8, lines 35-40);

Offset for storing the starting offset of an updated area within the updated page (col. 8, lines 47-49); and

Size for storing the size of the updated area (col. 8, lines 50-52).

Regarding on claim 4, Bordsen does not explicitly teach checkpointing by occasionally writing the database in the main memory to said one or more backup disks as backup data. However, Bohannon teaches, "during a check point, a dirty pages from the in-memory database image are written to disk" (col. 11, lines 28-30). This teaches the pages from the database images are copied into the disk. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify the teaching of Bohannon into Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claim 5, Bordsen does not teach the step of checkpointing uses the transaction.

However, Bahannon teaches the step of checkpointing uses the transaction (col. 11, line 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claim 6, Bordsen does not teach the step of checkpointing uses the action consistent.

However, Bohannon teaches the step of checkpointing uses the action consistent checkpointing policy (col. 11, lines 33-37).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claims 7 and 29, Bordsen does not teach the step of checkpointing uses the fuzzy checkpointing policy.

Bordsen does not teach the step of checkpointing uses the fuzzy checkpointing policy (col. 11, lines 33-37).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claims 8 and 30, Bordsen teaches the step of recovering comprises the step of:

Loading the backup data from said one or more backup disks into the main memory database (col. 9, lines 39-55); and

Loading the log from said one or more log disks into the main memory database in order to restore the main memory database to the most recent consistent state (col. 9, lines 22-28).

Regarding on claim 9, Bordsen teaches the step of loading the backup data is executed in parallel by partitioning the backup data (col. 7, lines 28-29).

Regarding on claims 10 and 32, Bordsen teaches the step of loading the log comprises the step of:

Reading the log records from said one or more log disks (non-volatile memory) (col. 9, lines 39-55); and

Playing the log records in two pass to restore the main memory database to the latest consistent state (col. 9, lines 22-28).

Regarding on claims 11, 13, 15, 20 and 22, Bordsen the step of reading the log records and the step of playing the log records are executed in a pipeline (col. 8, lines 61-67).

Regarding on claims 12 and 16, Bordsen teaches the step of reading the log records is executed in parallel by partitioning the log records as well as the step of playing the log records (col. 9, lines 22-28).

Regarding on claims 14 and 33, Bordsen teaches the step of loading the log comprises the steps of:

Reading log records from said one or more log disks (non-volatile memory) (col. 9, lines 39-55); and

Playing the log records in one pass to restored the main memory database to the latest consistent state (col. 9, lines 22-28).

Regarding on claims 16 and 21, Bordsen teaches the step of reading the log records in executed in parallel by partitioning the log records as well as the step of playing the log records (col. 9, lines 39-55).

Regarding on claim 18, Bordsen teaches the step of filling the main memory database with 0s in advance (col. 8, lines 10-13).

Regarding on claims 19 and 31, Bordsen teaches the step of loading the backup data comprises the step of:

Reading the backup data from said one or more backup disks (non-volatile memory) (col. 9, lines 39-55); and

Playing the backup data by applying the XOR operation between the backup data and the main memory database (col. 9, lines 22-28).

Regarding on claim 21, Bordsen teaches the step of reading the backup data is executed in parallel by partitioning the backup data as well as the step of playing the backup data (col. 7, lines 28-29).

Regarding on claim 23, Bordsen teaches the step of loading the backup data and the step of loading the log records are executed in parallel (col. 7, lines 28-29).

Regarding on claim 35, Bodsen teaches the medium is a CD (storage media) (col. 9, lines 24).

Regarding on claim 36, Bodsen teaches the medium is a magnetic tape (col. 9, lines 25-26).

Conclusion

4.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baoquoc N. To whose telephone number is (703) 305-1949 or via e-mail BaoquocN.To@uspto.gov. The examiner can normally be reached on Monday-Friday: 8:00 AM – 4:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached at (703) 305-4393.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Any response to this action should be mailed to:

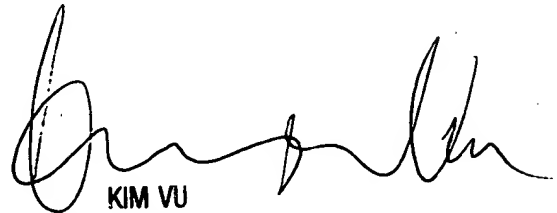Commissioner of Patents and Trademarks

Washington, D.C. 20231.

The fax numbers for the organization where this application or proceeding is assigned are as follow:

- (703) 746-7238   [After Final Communication}]
- (703) 746-7239   [Official Communication]
- (703) 746-7240   [Non-Official Communication]

Hand-delivered responses should be brought to:

Crystal Park II

2121 Crystal Drive

Arlington, VA 22202

Fourth Floor (Receptionist).

KIM VU

SUPERVISORY PATENT EXAMINER

TECHNOLOGY CENTER 2100

Baoquoc N. To

March 20, 2003